Conclusions: RCA occlusion provides a reproducible model for study of the mediators of ischemia-induced AV block. Blockade of A1 receptors with N-0861 results in attenuation of AH prolongation with ischemia, and rapid return of conduction after relief of ischemia. This suggests adenosine is one of the primary mediators of ischemia-induced AV conduction disturbances.

826 Intraoperative Use of Echocardiography

Monday, March 30, 1998, 4:00 p.m.–5:30 p.m.
Georgia World Congress Center, Room 367W

4:00

826-1 Effect of Intraoperative Echocardiography on Surgical Decision Making During Cardiac Surgery

J. Shanewise, S. Connolly, W.S. Weintraub. *Emory University, Atlanta GA, USA*

Between 11/95 and 2/97, 1097 patients undergoing cardiac surgery had intraoperative echocardiography (IOE); 953 had TEE alone, 28 epiaortic echocardiography alone, and 116 both. In 105 cases (9.6%) IOE findings changed the surgical management in some way. Preoperative characteristics such as age, sex, hypertension, CHF, diabetes, severe angina, prior MI, prior CABG, and EF did not predict whether IOE would change surgical management. Urgent surgery significantly increased the likelihood of management change based on IOE, with 8 of 37 (22%) cases changed (P = 0.03). Cases including some kind of valve surgery were significantly more likely to have surgical changes based on IOE than isolated CABG cases, 50/321 (15.6%) vs 38/520 (7.3%)(P = 0.0001). Findings on baseline IOE before CPB that were associated with change in surgical plan included LA enlargement (P = 0.0003), 3+ MR (P < 0.0001), and moderate or severe atherosclerotic changes of the ascending aorta (P < 0.0001) or aortic arch (P < 0.008). There were 23 cases which had changes in arterial cannulation or aortic cross clamp management because of aortic atherosclerosis detected with IOE. There were 16 cases in which previously unplanned valve surgery was performed, and 10 cases in which previously planned valve procedures were not performed because of IOE findings. There were 9 problems with valve surgery, 2.8% of all valve cases, detected with IOE after CPB allowing immediate revision. These included 3 inadequate valve repairs, 3 significant prosthetic perivalvular leaks, 2 bileaflet mechanical valves with an immobile leaflet, and one large, mobile LA mass. There 10 cases in which IOE detected unexpected pathology which altered surgical treatment, including 3 large pleural effusions, 2 aortic dissections, 1 VSD, 1 ASD, 1 LA neoplasm, 1 LV thrombus, and 1 HOCM. IOE may have a significant beneficial effect on the course of cardiac surgery.

4:15

826-2 Transesophageal Echocardiography as the Guiding Imaging Technique During Port Access Minimally Invasive Cardiac Surgery

R.M. Applebaum, W.M. Cutler, N. Bhardwaj, S.B. Colvin, A.C. Galloway, G.H. Ribakove, E.A. Grossi, D.S. Schwartz, R.V. Anderson, P.A. Tunick, I. Kronzon. *NYU Medical Center, NYC, NY, USA*

Background: The development of endovascular catheters (ECs) placed via the femoral vessels has enabled pts to be on cardiopulmonary bypass without the need for direct visualization of the heart or great vessels via sternotomy. This has allowed cardiac surgery to be performed through a smaller thoracotomy incision. Placement of ECs has been performed with fluoroscopic guidance, which has major imaging limitations.

Purpose: To determine the use of transesophageal echocardiography (TEE) as a primary imaging technique to assist the placement of ECs during minimally invasive port access cardiac surgery (PACS).

Methods: PACS was performed in 157 pts. All pts had intraoperative TEE to visualize the coronary sinus (CS) os, right atrium, superior vena cava, and the thoracic aorta, to assist the placement of the CS catheter venous cannula, and endoaortic balloon clamp.

Results: 74 pts had PACS mitral valve surgery, 42 had CABG, 28 had aortic valve replacement, 7 ASD repair (6 other). TEE could visualize the cardiac structures for the placement of ECs in 100% of pts. In 5 pts, the endoaortic clamp was not placed because of significant atherosclerosis seen on TEE. Persistent left superior vena cava was found in 2 pts. The location of the endoaortic balloon clamp above the sinuses of Valsalva, and the degree of balloon inflation were determined by TEE. Fluoroscopy was helpful only as an aid to TEE in placement of the CS catheter.

Conclusion: TEE is an excellent imaging modality for the proper guiding of placement of these new ECs, obviating the need for fluoroscopy except as an aid to TEE for the placement of CS catheters.

4:30

826-3 Intraoperative Three-dimensional Transesophageal Echo is Feasible for the Quantification of Left Ventricular Volumes

C.S. Breburda, S. Merrick, M.K. Cahalan, N.B. Schiller, E. Foster. *Univ. of Cal. at San Francisco, CA, USA*

Three-dimensional echocardiography (3DE) has been validated for the quantification of LV volumes. However the role of intraoperative 3DE and its comparison with 2D TEE is unknown. We hypothesized that quantitative intraoperative 3DE is feasible.

Methods: We studied 15 pts (61 ± 15 yrs, 10 M) with intraoperative 2D TEE and 3DE (HP and TomTec), using gated rotational acquisitions, every 10 degree with 50% spatial and temporal resolution. Basal view, short axis and deep gastric views were obtained pre- and postoperatively (90 total). Enddiastolic (EDV), endsystolic (ESV) volumes were manually traced in 8 short axis using thresholding. 2DE volumes were calculated (Simpson).

Results: all pts underwent CABG, 4 pts additional valvular surgery. Average time for 3DE quantification was 10 ± 3 min. Mean EDV and ESV agreed significantly pre- and postoperatively between 2DE and 3DE, ejection fraction (EF) and stroke volume (SV) agreed only postoperatively. (regression analysis)

	PREOP			POSTOP		
ml	2DE	3DE	r	2DE	3DE	r
EDV	96 ± 50	87 ± 42	0.71*	96 ± 72	87 ± 54	0.95*
ESV	61 ± 39	57 ± 32	0.60*	56 ± 51	58 ± 43	0.96*
SV	34 ± 20	57 ± 20	ns	40 ± 31	29 ± 21	0.65*
EF (%)	38 ± 19	31 ± 13	ns	42 ± 20	35 ± 16	0.77*

*p < 0.003 *p < 0.0001

Conclusions: 1. Intraoperative direct quantification of LV volumes by 3DE is feasible *2.* 3DE shows a stronger agreement with 2DE postoperatively suggesting an improved LV spherical geometry.

4:45

826-4 The Three-dimensional Echocardiographic Surgical View of the Mitral Valve: Benefit Relative to Two-dimensional Imaging

C.H.P. Jansen, N. Nathan, T. Buck, P. Hunziker, C.W. Akins, G. Vlahakes, R.A. Levine. *Massachusetts General Hospital, Boston, MA, USA*

Evaluating the extend and location of prolapsing mitral leaflet (ML) segments is essential to plan valve repair and is currently done by observers integrating multiple 2D echocardiography images. 3D echo (3DE) can rapidly display all segments in a surgical view from the left atrium. To compare agreement of 3D and 2D approaches with surgical findings, as well as observer variability and rapidity of evaluation, we studied 16 patients undergoing repair of prolapsing mitral valve. Five independent observers reviewed the 2D and 3D images blinded to the surgical reports. Localization of prolapsing segments was coded for the medial/central/lateral segments of both leaflets by each observer and the surgeon.

Result: The animated 3D images permitted rapid evaluation of segmental anatomy compared with the 2D mental reconstruction (mean of 40 sec vs. 7 min 30 sec). Segmental scoring of bulging (prolapse and flail) by 3DE agreed more often with the surgical map than the 2D-derived scores (88% vs. 79% agreement, p < 0.0001). Observer concordance was considerately higher for the 3D vs. the 2D approach (chi-square = 197 vs. 105).

Conclusion: 3DE allows anatomic localization of prolapsing leaflet segments with greater accuracy, reliability and rapidity than the conventional 2DE approach.

MONDAY ORAL